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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	PAPER NUMBER
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,505	TANI ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/26/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on 11/26/03 was considered by the examiner.

Drawings

3. Figure 15 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: on page 24, reference numeral 10 is not shown in Figure 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not

accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: on page 32, membrane electrode structure 9 is not shown in Figure 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the following as described in the specification: reference numerals 3, 7, 8 in Figure 1(f) (*Top Part or Top Section*) appears not to point to the described features. Specifically, reference numeral 3 and 8 point to the same feature. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as

"amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. Note that the title is directed only to the method.

8. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet *within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length* since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. *It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," "The present invention" etc.*

9. The abstract of the disclosure is objected to because it contains no description of the claimed electrical apparatus and transport machine. Correction is required. See MPEP § 608.01(b).

10. The disclosure is objected to because of the following informalities: the specification contains no description of Figures 1A-F and 9A-F. Specification only describes Figures 1 and 9. Each and every figure should be briefly describe in the specification. Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Claims 1 and 14-16 recite the limitation "the previously formed diffusion electrode" in lines 20 (claim 1), lines 21 (claims 14-16). There is insufficient antecedent basis for this limitation in the claim.

14. Claims 1 and 14-16 recite the limitation "said laminated body" in lines 21 and 23 (claim 1, two occurrences), lines 22 and 24 (claims 14-16, two occurrences). There is insufficient antecedent basis for this limitation in the claim.

15. Claims 1 and 14-16 recite the limitation "the two" in line 22 (claim 1), lines 23 (claims 14-16). There is insufficient antecedent basis for this limitation in the claim.

16. Claims 1, 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the claim recites "*laminating the previously formed diffusion electrode on said electrode catalyst layer of said laminated body through said hydrophilic layer, pressing the two under heating, so as to integrate said laminated body and said diffusion electrode*". If the previously formed diffusion electrode is already laminated on the electrode catalyst layer, then, it is unclear how the laminated body is integrated to the diffusion electrode one more time (re-lamination). Thus, it is unclear whether applicant intends to recite single or multiple laminating steps or a different deposition step by another integration technique.

17. Claim 5 recites the limitation "an ion conducting material" in lines 4-5 (two occurrences). There is insufficient antecedent basis for this limitation in the claim. Claim 1 contains an earlier recitation thereof.

18. Claim 7 recites the limitation "a hydrophilic layer" in line 4. There is insufficient antecedent basis for this limitation in the claim. Claim 1 contains an earlier recitation thereof.

19. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required

feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 7 recites the broad recitation "*the maximum height of surface roughness*", and the claim also recites a range "*Rmax of 40 or less*" which is the narrower statement of the range/limitation. As best understood, a maximum value (*i.e. maximum height*) must be a single discrete value instead of a range.

20. Claim 9 recites the limitation "the air" in line 6 and "the thickness" in line 7. There is insufficient antecedent basis for this limitation in the claim.

21. Claim 11 recites the limitation "said thermal transfer" in line 2. There is insufficient antecedent basis for this limitation in the claim.

22. Claim 13 recites the limitation "the applied pressure" in line 4. There is insufficient antecedent basis for this limitation in the claim.

23. Claims 15-16 are indefinite because it claims both an apparatus and the method steps of using the apparatus. Therefore, it embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101. *In Ex parte Lyell, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990).*

Claims 15-16 provides for the use of a polymer electrolyte fuel cell, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 15-16 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a

process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

25. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

26. Claims 1-3 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Landsman et al 3956014.

The present application is directed to a method for producing a membrane electrode structure wherein the disclosed inventive concept comprises the specific step of forming a water repellent layer and a hydrophilic layer. An electrical apparatus and a transport machine are also embraced.

As to claim 1:

(***Emphasis added→***) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1st full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2nd full paragraph on page 1*).

As to claims 2-3 and 9-13:

Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.

(Emphasis added→) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

Landsman et al disclose a method of making a structured electrochemical cell structure (TITLE) for gas diffusion electrodes used in fuel cells (COL 1, lines 7-10) including forming alternate layers of porous hydrophobic material and porous hydrophilic catalyst-containing material. The electrode is formed by depositing the alternate layers of material (ABSTRACT/CLAIM 4). The deposition of layers also includes bonding them together by using

pressure and heating them at certain temperatures (hot pressing) so as to laminate (*formation of layers*) (COL 5, lines 25-32). A mixture containing water, Teflon and a catalyst dispersion and carbon black is used to form the hydrophilic material based on certain desirable compositions (COL 5, lines 1-42). Pt supported on carbon black is disclosed (COL 3, lines 1-3). Catalyst provides the hydrophilic property (COL 1, lines 18-22). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Landsman et al in the membrane electrode structure of the AAPA as Landsman et al teaches his method of including hydrophilic layers provide an electrochemical cell electrode structure having clearly defined hydrophobic and hydrophilic passages in which the catalyst can be located at the interfaces therebetween in a manner producing maximum catalyst utilization and minimum resistance to the flow of reactants, products, ions and electrons. Additionally, forming layers of hydrophilic materials per se prevent unwanted agglomeration of particles which may result either in waste of catalyst or poor ionic and electronic conductance.

27. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Heffler 4104197.

As to claim 1:

(***Emphasis added→***) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is

obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1st full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2nd full paragraph on page 1*).

As to claims 2-3 and 9-13:

Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.

(Emphasis added→) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer; the specific pore size; the specific content of ion-conducting material; and the specific surface roughness characteristics.

As to claim 1:

Heffler discloses a method of making gas diffusion electrodes for electrochemical cells (TITLE/CLAIM 1), the method includes forming a hydrophobic layer comprising mixing coal powder with PTFE in a suspension medium; forming a hydrophilic layer comprising mixing catalyst containing activated carbon powder with PTFE in a suspension medium; superposing (*laminating*) the hydrophilic and hydrophobic layers, and sintering the layers together with heat and under pressure to form the electrode (CLAIM 1/COL 2, lines 62-65).

As to claim 4:

Heffler disclose that the most frequent pore diameter of the hydrophobic and hydrophilic layers is 1.8 microns and 0.08 microns, respectively (CLAIM 1).

As to claims 5-6:

Heffler disclose that for the production of the working layer 2 (hydrophilic layer): 35 g of activated carbon with a particle size of 0.5 microns and the applied Pt catalyst are used and they amount to about 10 % by wt, additionally about 18 % wt PTFE and 17 % wt polyethylene in 200 ml hexane is used (COL 2, lines 51-60).

As to claims 7-8:

Since Heffler disclose certain materials for the production of the hydrophilic layer per se (COL 2, lines 51-60). *It is contended that the claimed maximum height of surface roughness as well as the surface roughness ratio are inherent properties or characteristics of the material. Particularly, since the recited hydrophilic layer material covers a very large number of applicable materials which can be used therefor, it is also contended that any hydrophilic layer comprising any combination of conducting and ion-conducting materials would produce a hydrophilic layer exhibiting the specifically claimed maximum height of surface roughness as well as the surface roughness ratio*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Heffler in the membrane electrode structure of the AAPA as Heffler teaches the formation and lamination of the specific hydrophilic layer in combination with a hydrophobic layer provides the advantages of achieving a low power loss, compared to pure oxygen operation, in a power

independent of the humidity of air, and in quick setting times of the load potentials (COL 1, lines 51-56). Thus, it reduces power drop in the operation of the electrode (COL 1, lines 38-42). In addition to that, it also provides a gas diffusion electrode which is simple in design, rugged in construction and economical to manufacture (COL 1, lines 65-68).

With respect to the specific pore size and the specific content of ion-conducting material, the invention as whole would have been obvious to a person with ordinary skill because Heffler discloses that the selected fractions of materials (composition) represents the optimum between the opposing parameters of electric conductivity and permeability, on the one hand, and hydrophobic or hydrophilic behavior, on the other hand. Additionally, Heffler discloses that due to pore size and porosity gas permeability is good, thereby cell potential as whole is improved. As a result, Heffler use/disclose the specific pore size and the specific content of ion-conducting material as variables that achieve a recognized result. Therefore, the specific pore size and the specific content of ion-conducting material are construed as result-effective variables, and the discovery of optimum of result effective variable in a known process is ordinarily within the skill of art. *In re Boesh 205 USPQ 215 (CCPA 1980). In re Aller 105 USPQ 233, 235; In re Hoeschele 160 USPQ 809, In re Antonie 195 USPQ 6 (MPEP 2144.05 II. Optimization of Ranges). Generally, differences in concentration (content) will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235(CCPA 1955)*

28. Claims 1-3 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Goldsmith 4568442.

As to claim 1:

(***Emphasis added***→) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-

repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1st full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2nd full paragraph on page 1*).

As to claims 2-3 and 9-13:

Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.

(Emphasis added→) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

Goldsmith disclose a method for the preparation of a gas diffusion composite electrode (CLAIM 8) for fuel cells (COL 1, lines 8-10) including a hydrophilic layer (CLAIM 8/ COL 6, lines 30-65/COL 2, lines 54-65) and laminating said layer to a current distributor and a backing

layer comprising a hydrophobic polymer and a pore forming material and sintering said layers (CLAIM 8/ COL 6, lines 45-60/ COL 2, lines 54-65). The hydrophilic layer is composed of a single homogenous layer comprising a hydrophobic polymer and a major amount of a hydrophilic material such as carbon black in an aqueous dispersion (COL 5, lines 62-68); PTFE is also used (COL 6, lines 7-25/ COL 2, lines 54-65). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Goldsmith in the membrane electrode structure of the AAPA as Goldsmith reveals that by further laminating a hydrophilic layer in a gas diffusion electrode, the tendency of the prior art gas diffusion composite electrodes to flood or wet-out is overcome. Thus, greater resistance to flooding or wet-out of the electrochemically active layer of the composite electrode is obtained.

29. Claims 1-3 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of the Japanese publication JP 06-44984 (herein called the JP'984).

As to claim 1:

(***Emphasis added→***) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as

disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1st full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2nd full paragraph on page 1*).

As to claims 2-3 and 9-13:

Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any

components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.

(Emphasis added→) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

The JP'984 discloses electrode for solid high polymer electrolyte fuel cell (TITLE) formed by laminating, press-bonding and sintering by hot pressing a hydrophilic reaction layer composed of hydrophilic and hydrophobic carbon blacks and polytetrafluoroethylene and a hydrophobic gas diffusion layer composed of hydrophobic carbon black and PTFE to obtain a gas diffusion electrode having water repellency (ABSTRACT). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of the JP'984 in the membrane electrode structure of the AAPA as the JP'984 discloses this provides an electrode having an excellent working characteristic as a gas diffusion electrode.

Claim Rejections - 35 USC § 102

30. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

31. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

32. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

33. Claims 14-16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Applicant's Admission of Prior Art (heretofore 'the AAPA').

(***Emphasis added→***) The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1st full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1st full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2nd full paragraph on page 1*).

Examiner's note: *It is noted that the instant claims are being construed as product-by-process claims and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.*

Therefore, the claims are anticipated by the AAPA. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324* **(Refer to MPEP 2113: Product-by-Process Claims)**.

34. Claims 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Landsman et al 3956014.

Landsman et al disclose a method of making a structured electrochemical cell structure (TITLE) for gas diffusion electrodes used in fuel cells (COL 1, lines 7-10) including forming alternate layers of porous hydrophobic material and porous hydrophilic catalyst-containing material. The electrode is formed by depositing the alternate layers of material (ABSTRACT/CLAIM 4). The deposition of layers also includes bonding them together by using pressure and heating them at certain temperatures (hot pressing) so as to laminate (*formation of layers*) (COL 5, lines 25-32). A mixture containing water, Teflon and a catalyst dispersion and carbon black is used to form the hydrophilic material based on certain desirable compositions (COL 5, lines 1-42). Pt supported on carbon black is disclosed (COL 3, lines 1-3). Catalyst

provides the hydrophilic property (COL 1, lines 18-22). *These materials exhibit conducting and ion-conducting properties.*

Examiner's note: *It is noted that the instant claims are being construed as product-by-process claims and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.*

Therefore, the claims are anticipated by Landsman et al. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324* **(Refer to MPEP 2113: Product-by-Process Claims)**.

35. Claims 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Heffler 4104197.

Heffler discloses a method of making gas diffusion electrodes for electrochemical cells (TITLE/CLAIM 1), the method includes forming a hydrophobic layer comprising mixing coal powder with PTFE in a suspension medium; forming a hydrophilic layer comprising mixing catalyst containing activated carbon powder with PTFE in a suspension medium; superposing (*laminating*) the hydrophilic and hydrophobic layers, and sintering the layers together with heat and under pressure to form the electrode (CLAIM 1/COL 2, lines 62-65). *These materials exhibit conducting and ion-conducting properties.*

Examiner's note: *It is noted that the instant claims are being construed as product-by-process claims and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.*

Therefore, the claims are anticipated by Heffler. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324* **(Refer to MPEP 2113: Product-by-Process Claims)**.

36. Claims 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Goldsmith 4568442.

Goldsmith disclose a method for the preparation of a gas diffusion composite electrode (CLAIM 8) for fuel cells (COL 1, lines 8-10) including a hydrophilic layer (CLAIM 8/ COL 6, lines 30-65/COL 2, lines 54-65) and laminating said layer to a current distributor and a backing layer comprising a hydrophobic polymer and a pore forming material and sintering said layers (CLAIM 8/ COL 6, lines 45-60/ COL 2, lines 54-65). The hydrophilic layer is composed of a single homogenous layer comprising a hydrophobic polymer and a major amount of a hydrophilic material such as carbon black in an aqueous dispersion (COL 5, lines 62-68); PTFE is also used (COL 6, lines 7-25/ COL 2, lines 54-65). *These materials exhibit conducting and ion-conducting properties.*

Examiner's note: *It is noted that the instant claims are being construed as product-by-process claims and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.*

Therefore, the claims are anticipated by Goldsmith. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324* **(Refer to MPEP 2113: Product-by-Process Claims)**.

37. Claims 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the Japanese publication JP 06-44984 (herein called the JP'984).

The JP'984 discloses electrode for solid high polymer electrolyte fuel cell (TITLE) formed by laminating, press-bonding and sintering by hot pressing a hydrophilic reaction layer composed of hydrophilic and hydrophobic carbon blacks and polytetrafluoroethylene and a hydrophobic gas diffusion layer composed of hydrophobic carbon black and PTFE to obtain a gas diffusion electrode having water repellency (ABSTRACT). *These materials exhibit conducting and ion-conducting properties.*

Examiner's note: *It is noted that the instant claims are being construed as product-by-process claims and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its*

method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.

Therefore, the claims are anticipated by the JP'984. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324* **(Refer to MPEP 2113: Product-by-Process Claims)**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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PRIMARY EXAMINER

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